

DATA STRUCTURES AND ALGORITHMS COURSE CONTENT

Introduction

- Variables
- Datatypes
- Data Structures
- Structured Representation
- Statements and Control Structures
- Abstract Data Types
- Static & Dynamic Data Types
- Arrays & Pointers
- Linked List
- What is an algorithm
- Why analysis of Algorithms
- Goal of analysis algorithms
- What is the Running Time Analysis
- How to Compare Algorithms
- What is the Rate of Growth
- Commonly Used Rate of Growth
- Types of Analysis
- Big-O Notation
- Omega Notation
- Theta Notation
- Why is it called Asymptotic Notation
- Guidelines for Asymptotic Notation
- Properties of Notation
- Commonly used Logarithms and Summations
- Master Theorem For divide and Conquer
- Problems on divide and Conquer Master theorem
- Master theorem for subtract and Conquer Recurrences
- Variant of subtraction and conquer master theorem
- Method of Guessing and Confirm
- Amortized Analysis
- Problems on Algorithms Analysis
- Testing

Stacks with Algorithms

- Defining stack
- Application of stack
- Conversion and Evaluation of Expressions
- Operations of stack

- Stack implemented as an array
- Stack implemented with pointers
- Expression Parsing
- Using Stacks to solve problems Conversion and Evaluation of Expressions

Queues with Algorithms

- Defining Queue
- Application of Queue
- Operation of Queue
- Circular Queue
- Priority Queue
- Double Ended Queue
- Queue implemented with Pointers
- Differences between Stacks and Queues
- Problems on Queues

Linked List

- Introduction
- What is a Linked List
- Advantages of Linked List over an Array
- Application of Linked List
- Types of Linked Lists
- Singly Linked Lists
- Operation of Singly Linked Lists
- Doubly Linked Lists
- Operations on Doubly Linked Lists
- Circular Linked Lists
- Circular Double Linked Lists
- Uses of Linked Lists
- Difference between Arrays and Linked List
- A memory-Efficient Doubly Linked List
- Problems on Linked List

Trees

- Introduction
- Binary Trees
- Implementation of Binary Trees
- Insertion into a Binary Tree
- Binary Tree Deletion

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- Traversing a Binary Tree
- Binary Search Trees
- Binary Height Balanced Trees
- AVL Trees
- B-Trees

Design Strategies

- Divide and Conquer
- Max-Min Problem
- Greedy Method
- Job Sequencing with Deadline
- Dynamic Programming
- 0-1Knapsack

Sorting Techniques with Order of Growth

- Introduction
- Why Sorting Necessary
- Classification of sorting Algorithms
- Other classification
- Bubble Sort
- Selection Sort
- Quick Sort
- Merge Sort
- Iterative Merge Sort
- Introduction to Heap
- Heap Operations
- Heap Sort
- Comparison of Sorting Algorithm
- Non-Comparison Sorting Algorithm

Searching Techniques

- Introduction
- Linear Search
- Binary Search

Hashing Techniques

- Introduction
- What is Hashing
- HashTable ADT
- Hashing Techniques
- Division Method

- Mid Square Method
- Folding Method
- Hash Collision
- Open Address

Graphs

- Introduction
- Types of Graphs
- Various Representation of Graphs
- Application of Graphs
- Graph Traversals-DFS,BFS
- Design and Analysis of Algorithms Graphs
- Spanning Tree
- Shortest Paths
- Multistage Graphs
- Travelling Salesman Problem
- Optimal Cost Binary Search

Highlights:

- Paper Solving on all Data Structures Concepts including MNC Company Papers Amazon, Oracle ,Microsoft etc
- Solving of websites Questions of Product Based Company's
- As per Student Request can work on other algorithms also.